

CLAIMS:

1. A method of enhancing the taste of a beer with a mineral additive, the mineral additive including soluble compounds of the following minerals to the following ranges of
5 final concentrations of the respective element in the finished beer, to enhance taste characteristics of the diluted beer when compared to a dilution solely with water:-
group A minerals: calcium from 5.9mg/L to 236mg/L, and magnesium from 1.3 to 52mg/L
group B minerals: phosphorus from 3.0 to 360mg/L, potassium from 12mg/L to
10 480mg/L, silicon at 0.075mg/L to 30mg/L, sodium at 0.8 mg/L to 32mg/L and chlorine at 0.9mg/L to 36mg/L,
group C minerals: boron from 0 to 76 µg/L, chromium from 0 to 0.4µg/L, cobalt from 0 to 0.4µg/L, copper from 0 to 17.2 µg/L, iodine from 0 to 5.2 µg/L, lithium from 0 to 1.6 µg/L, manganese from 0 to 1.6 µg/L, molybdenum from 0 to 2.0 µg/L, nickel from 0 to
15 2.0 µg/L, selenium from 0 to 136 µg/L, tin from 0 to 01.6 µg/L, vanadium from 0 to 0.12 µg/L and zinc from 0 to 104 µg/L,
group D minerals: iron 0 to 20 µg/L.
2. The method of enhancing the taste of a beer with a mineral additive according to
20 claim 1 including diluting of the base beer with the addition of water, the base beer being diluted to between 0.5% and 90% of its original strength.
3. The method of enhancing the taste of a beer with a mineral additive according to
claim 1 wherein at least some of the minerals of groups A, B, C and D are added in dry
25 form.
4. The method of enhancing the taste of a beer with a mineral additive according to either claim 1 or 2 wherein the finished beer is a stout beer and the minerals are added to a final concentration in the finished beer as follows:

group A minerals: calcium from 70mg/L to 143 mg/L, and magnesium from 15 mg/L to 32 mg/L

group B minerals: phosphorus at least 36 mg/L, potassium from 144 mg/L to 288 mg/L, silicon at 9 mg/L to 18 mg/L, sodium at 9 mg/L to 20 mg/L and chlorine at 11 mg/L to 22 mg/L,

group C minerals: boron from 23 to 46 µg/L, chromium from 0.12 to 0.24 µg/L, cobalt from 0.12 to 0.24µg/L, copper from 5 to 11 µg/L, iodine from 1.5 to 3.5 µg/L, lithium from 0.45 to 1.00 µg/L, manganese from 0.45 to 1.00 µg/L, molybdenum from 0.6 to 1.2 µg/L, nickel from 0.6 to 1.2 µg/L, selenium from 40 to 82 µg/L, tin from 0.45 to 1.00 µg/L, vanadium from 0.035 to 0.075 µg/L and zinc from 31 to 62 µg/L,

group D minerals: iron 6 to 12 µg/L.

5. The method of enhancing the taste of a beer with a mineral additive according to either claim 1 or 2 wherein the finished beer is a pilsener beer and the minerals are added to a final concentration in the finished beer as follows:

group A minerals: calcium from 188 mg/L to 224 mg/L, and magnesium from 41 mg/L to 50 mg/L

group B minerals: phosphorus at least 96 mg/L, potassium from 380 mg/L to 460 mg/L, silicon at 24 mg/L to 29 mg/L, sodium at 25 mg/L to 31 mg/L and chlorine at 28 mg/L to 35 mg/L,

group C minerals: boron from 60 to 73 µg/L, chromium from 0.3 to 0.4 µg/L, cobalt from 0.3 to 0.4 µg/L, copper from 13 to 17 µg/L, iodine from 4 to 5 µg/L, lithium from 1.2 to 1.6 µg/L, manganese from 1.2 to 1.6 µg/L, molybdenum from 1.5 to 2.0 µg/L, nickel from 1.5 to 2.0 µg/L, selenium from 40 to 82 µg/L, tin from 1.2 to 1.6 µg/L, vanadium from 0.09 to 0.12 µg/L and zinc from 83 to 99 µg/L,

group D minerals: iron 16 to 19 µg/L.

6. The method of enhancing the taste of a beer with a mineral additive according to either claim 1 or 2 wherein the finished beer is a light beer and the minerals are added to a final concentration in the finished beer as follows:

group A minerals: calcium from 11 mg/L to 21 mg/L, and magnesium from 2.6 to
5 4.6 mg/L

group B minerals: phosphorus at least 6 mg/L, potassium from 24 mg/L to 42 mg/L, silicon at 1.5 mg/L to 2.7 mg/L, sodium at 1.5 mg/L to 2.8 mg/L and chlorine at 1.8 mg/L to 3.2 mg/L,

group C minerals: boron from 3.5 to 7 µg/L, chromium from 0.02 to 0.035 µg/L,
10 cobalt from 0.02 to 0.035 µg/L, copper from 0.8 to 1.6 µg/L, iodine from 0.25 to 0.5 µg/L, lithium from 0.08 to 0.14 µg/L, manganese from 0.08 to 0.14 µg/L, molybdenum from 0.1 to 0.18 µg/L, nickel from 0.1 to 0.18 µg/L, selenium from 6.8 to 12 µg/L, tin from 0.08 to 0.14 µg/L, vanadium from 0.006 to 0.011 µg/L and zinc from 5 to 9.5 µg/L,

group D minerals: iron 1 to 1.8 µg/L.
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7. The method of enhancing the taste of a beer with a mineral additive according to either claim 1 or 2 wherein the finished beer is an extra light beer and the minerals are added to a final concentration in the finished beer as follows:

group A minerals: calcium from 23 mg/L to 42 mg/L, and magnesium from 5 to 9.5
20 mg/L

group B minerals: phosphorus at least about 12 mg/L, potassium from 48 mg/L to 84 mg/L, silicon at 3 mg/L to 5.3 mg/L, sodium at 3.2 mg/L to 5.6 mg/L and chlorine at 3.6 mg/L to 6.3 mg/L,

group C minerals: boron from 7.5 to 14 µg/L, chromium from 0.04 to 0.07 µg/L,
25 cobalt from 0.04 to 0.07 µg/L, copper from 1.7 to 3.2 µg/L, iodine from 0.5 to 1.0 µg/L, lithium from 0.15 to 0.3 µg/L, manganese from 0.15 to 0.3 µg/L, molybdenum from 0.2 to 0.35 µg/L, nickel from 0.2 to 0.35 µg/L, selenium from 13 to 24 µg/L, tin from 0.15 to 0.3 µg/L, vanadium from 0.012 to 0.021 µg/L and zinc from 10 to 19 µg/L,

group D minerals: iron 1 to 3.5 µg/L.

8. The method of enhancing the taste of a beer with a mineral additive according to either claim 1 or 2 wherein the finished beer is a medium strength beer and the minerals are added to a final concentration in the finished beer as follows:

5 group A minerals: calcium from 11 mg/L to 23 mg/L, and magnesium from 2.6 to 5 mg/L

group B minerals: phosphorus at least about 6 mg/L, potassium from 24 mg/L to 48 mg/L, silicon at 1.5 mg/L to 3 mg/L, sodium at 1.6 mg/L to 3.2 mg/L and chlorine at 6.8 mg/L to 3.6 mg/L,

10 group C minerals: boron from 3.5 to 8 µg/L, chromium from 0.02 to 0.04 µg/L, cobalt from 0.02 to 0.04 µg/L, copper from 0.8 to 1.8 µg/L, iodine from 0.25 to 0.5 µg/L, lithium from 0.08 to 0.15 µg/L, manganese from 0.08 to 0.15 µg/L, molybdenum from 0.1 to 0.2 µg/L, nickel from 0.1 to 0.2 µg/L, selenium from 6.8 to 13 µg/L, tin from 0.08 to 0.15 µg/L, vanadium from 0.005 to 0.012 µg/L and zinc from 5 to 10 µg/L,

15 group D minerals: iron 1 to 2 µg/L.

9. The method of enhancing the taste of a beer with a mineral additive according to either claim 1 or 2 wherein the finished beer is a full strength beer and the minerals are added to a final concentration in the finished beer as follows:

20 group A minerals: calcium from 17mg/L to 36 mg/L, and magnesium from 3.9 to 7.8 mg/L

group B minerals: phosphorus at least about 9mg/L, potassium from 36 mg/L to 72 mg/L, silicon at 2.2 mg/L to 4.5 mg/L, sodium at 2.4 mg/L to 4.8 mg/L and chlorine at 2.5 mg/L to 5.5 mg/L,

25 group C minerals: boron from 5.5 to 11.5 µg/L, chromium from 0.03 to 0.06 µg/L, cobalt from 0.03 to 0.06 µg/L, copper from 1.2 to 2.6 µg/L, iodine from 0.3 to 0.8 µg/L, lithium from 0.12 to 0.24 µg/L, manganese from 0.12 to 0.24 µg/L, molybdenum from 0.15 to 0.3 µg/L, nickel from 0.15 to 0.3 µg/L, selenium from 10 to 21 µg/L, tin from 0.12 to 0.24 µg/L, vanadium from 0.009 to 0.02 µg/L and zinc from 7.5 to 16 µg/L,

group D minerals: iron 1.5 to 3 µg/L.

10. The method of enhancing the taste of a beer with a mineral additive according to claim 1 wherein the mineral additive has elements present in certain proportions by element weight as follows:

group A; calcium from 25 to 82 and magnesium from 6 to 18,

group B; potassium from 50 to 180, silicon from 0.45 to 1.5, sodium from 3 to 30, chlorine from 3 to 28,

group C; boron from 0 to 0.060, chromium from 0 to 0.0005, cobalt from 0 to 0.0005, copper from 0 and 0.012, iodine from 0 to 0.006, lithium from 0 to 0.0015, manganese from 0 to 0.0015, molybdenum from 0 to 0.0015, nickel from 0 to 0.0005, selenium from 0 to 0.100, tin from 0 to 0.0015, vanadium from 0 to 0.1 and zinc from 0 and 0.100,

group D: Iron from 0 to 0.020,

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11. The method of enhancing the taste of a beer with a mineral additive according to claim 10 wherein a range of proportions of the group A elements in the mineral additive preparation are as follows, calcium from 44 to 74 and magnesium from 10 to 16.

20 12. The method of enhancing the taste of a beer with a mineral additive according to claim 11 wherein the proportion of calcium is about 59 and the most preferable proportion of magnesium is about 13.

13. The method of enhancing the taste of a beer with a mineral additive according to claim 10 wherein a range of proportions of the group B elements in the mineral additive preparation are as follows; potassium from 80 to 150, silicon from 0.55 to 1.0, sodium from 5 to 15, chlorine from 5 to 14.

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14. The method of enhancing the taste of a beer with a mineral additive according to claim 13 wherein the proportion of each group B element is as follows; potassium is about 120, silicon is about 0.75, sodium is about 8, and chlorine is about 9 mg/L.

5 15. The method of enhancing the taste of a beer with a mineral additive according to claim 10 wherein a range of proportions of the group C elements in the mineral additive preparation are as follows; boron from 0.010 to 0.040, chromium from 0.00005 to 0.0002, cobalt from 0.00005 to 0.0002, copper from 2 to 9, iodine from 0.0004 to 0.0025, lithium from 0.0001 to 0.0010, manganese from 0.0001 to 0.0010, molybdenum from 0.0001 to
10 0.0010, nickel from 0.00005 to 0.0002, selenium from 0.010 to 0.070, tin from 0.0001 to 0.0010, vanadium from 0.00001 to 0.00007 and zinc from 0.010 to 0.070.

16. The method of enhancing the taste of a beer with a mineral additive according to claim 15 wherein a most preferred proportion of each group C element is as follows; boron
15 is about 0.019, chromium is about 0.0001, cobalt is about 0.0001, copper is about 0.0043, iodine is about 0.0013, lithium is about 0.0004, manganese is about 0.0004, molybdenum is about 0.0005, nickel is about 0.0001, selenium is about 0.034, tin is about 0.0004, vanadium is about 0.00003 and zinc is about 0.026.

20 17. The method of enhancing the taste of a beer with a mineral additive according to claim 10 wherein a range of proportions of the group D element present in the mineral additive preparation is as follows: iron is from 0.002 to 0.012.

18. The method of enhancing the taste of a beer with a mineral additive according to
25 claim 17 wherein the proportion of iron is about 0.005.

19. The method of enhancing the taste of a beer with a mineral additive according to claim 1 wherein the group A minerals are made up separately and a buffer or acid is added to the group A minerals to adjust the pH of the group A minerals.

20. The method of enhancing the taste of a beer with a mineral additive according to claim 1 wherein the pH of the finished beer is adjusted to be in the range of 3.5 through to 5.0.
- 5 21. The method of enhancing the taste of a beer with a mineral additive according to claim 20 wherein the pH of the finished beer is no higher than 4.7.
22. The method of enhancing the taste of a beer with a mineral additive according to claim 20 wherein the pH of the finished beer is in the range of about 3.8 to about 4.5.
- 10 23. The method of enhancing the taste of a beer with a mineral additive according to claim 20 wherein the pH of a preparation of either the group A minerals or the mineral additive preparation is brought below about 4.5, to bring the suspension of Ca and Mg into solution.
- 15 24. The method of enhancing the taste of a beer with a mineral additive according to claim 22 wherein the pH is adjusted by an acceptable organic or mineral acid.
- 20 25. The method of enhancing the taste of a beer with a mineral additive according to claim 24 wherein the acid is phosphoric acid.
- 25 26. The method of enhancing the taste of a beer with a mineral additive according to either claim 24 or 25 wherein the pH is adjusted to about 4.0.
27. The method of enhancing the taste of a beer with a mineral additive according to claim 2 wherein the dilution is less than about 50%.
28. The method of enhancing the taste of a beer with a mineral additive according to claim 2 wherein dilution of the base beer is greater than about 20% and the mineral additive preparation is added to the base beer before gassing with carbon dioxide.
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29. The method of enhancing the taste of a beer with a mineral additive according to claim 1 wherein dilution of the base beer is less than about 5% the mineral additive is added after the base beer has been diluted with water and gassed with carbon dioxide.

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30. The method of enhancing the taste of a beer with a mineral additive according to claim 29 wherein one or more of the minerals is added in dry form.

31. The method of enhancing the taste of a beer with a mineral additive according to claim 1 wherein calcium is provided or partially provided in the form of calcium hydroxide $\text{Ca}(\text{OH})_2$ and magnesium is provided or partially provided in the form of $\text{Mg}(\text{OH})_2$ (magnesium hydroxide).

32. A method of enhancing the taste of a beer with a mineral additive according to claim 1, wherein:

phosphorous is provided or partially provided in the form of KH_2PO_4 (monobasic potassium phosphate);

potassium is provided or partially provided in the form of KH_2PO_4 (monobasic potassium phosphate) or KHCO_3 (potassium bicarbonate);

20 silicon is provided in the form of $\text{Na}_2\text{SiO}_3 \cdot 5\text{H}_2\text{O}$ (sodium metasilicate);

sodium is provided wholly or partially in a form selected from the group consisting of NaHCO_3 (sodium bicarbonate), $\text{Na}_2\text{B}_4\text{O}_7 \cdot 10\text{H}_2\text{O}$ (sodium tetraborate), NaCl (sodium chloride), $\text{Na}_2\text{MoO}_4 \cdot 2\text{H}_2\text{O}$ (sodium molybdate), $\text{Na}_2\text{SeO}_4 \cdot 10\text{H}_2\text{O}$ (sodium selenate), Na_2SeO_3 (sodium selenite), $\text{Na}_2\text{SiO}_3 \cdot 5\text{H}_2\text{O}$ (sodium silicate), Na_2SO_4 and $\text{Na}_2\text{SO}_4 \cdot 10\text{H}_2\text{O}$ (sodium sulphate); and

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chlorine is provided wholly or partially in a form selected from the group consisting of NaCl (sodium chloride), KCl (potassium chloride), CaCl_2 (calcium chloride) and MgCl_2 (magnesium chloride).

33. A method of enhancing the taste of a beer with a mineral additive according to claim 1, wherein, if present in the manufactured mineral water,

boron is provided wholly or partially in a form selected from one of the group consisting of $\text{Na}_2\text{B}_4\text{O}_7 \cdot 10\text{H}_2\text{O}$ (sodium tetraborate) and $\text{K}_2\text{B}_4\text{O}_7 \cdot 5\text{H}_2\text{O}$ (potassium

5 tetraborate);

chromium is provided in the form $\text{K}[\text{Cr}(\text{SO}_4)_2(\text{H}_2\text{O})_2] \cdot 6\text{H}_2\text{O}$ (chromium potassium sulphate);

cobalt is provided wholly or partially in a form selected from one or more of the group consisting of $\text{CoK}_2(\text{SO}_4)_2 \cdot 6\text{H}_2\text{O}$ (cobaltous potassium sulphate) and $\text{CoSO}_4 \cdot 7\text{H}_2\text{O}$

10 (cobalt sulphate);

copper is provided wholly or partially in a form selected from one or more of the group consisting of $\text{CuSO}_4 \cdot 5\text{H}_2\text{O}$ (cupric sulphate) and $\text{CuSeO}_4 \cdot 5\text{H}_2\text{O}$ (cupric selenate);

iodine is provided as (KI) potassium iodide;

lithium is provided wholly or partially in a form selected from one or more of the group consisting of $\text{Li}_2\text{SO}_4 \cdot \text{H}_2\text{O}$ (lithium sulphate), LiCl (lithium chloride) or $\text{Li}_2\text{SeO}_4 \cdot \text{H}_2\text{O}$ (lithium selenate);

manganese is provided wholly or partially in a form selected from one or more of the group consisting of $\text{MnSO}_4 \cdot \text{H}_2\text{O}$ (manganous sulphate) $\text{MnCl}_2 \cdot 4\text{H}_2\text{O}$ (manganous chloride);

molybdenum is provided in the form of $\text{Na}_2\text{MoO}_4 \cdot 2\text{H}_2\text{O}$ (sodium molybdate); nickel

20 is provided in the form of $\text{NiSO}_4 \cdot 6\text{H}_2\text{O}$ (nickel sulphate);

selenium is provided wholly or partially in a form selected from one or more of the group consisting of $\text{Na}_2\text{SeO}_4 \cdot 10\text{H}_2\text{O}$ (sodium selenate), K_2SeO_4 (potassium selenate), MgSeO_4 (magnesium selenate) and Na_2SeO_3 (sodium selenite);

tin is provided in the form of $\text{SnCl}_2 \cdot 2\text{H}_2\text{O}$ (stannous chloride);

25 vanadium is provided in the form of NH_4VO_3 (ammonium vanadate); and

zinc is provided wholly or partially in a form selected from one or more of the group consisting of $\text{ZnSO}_4 \cdot \text{H}_2\text{O}$ and $\text{ZnSO}_4 \cdot 7\text{H}_2\text{O}$ (zinc sulphate).

34. A method of enhancing the taste of a beer with a mineral additive according to claim 1, wherein, if present in the manufactured mineral water, iron is provided in the form of $\text{FeSO}_4 \cdot 7\text{H}_2\text{O}$ (ferrous sulphate).

5 35. Beer made in accordance with any one of claims 1 to 34.